Uncommon truths

Viruses, nuclear disasters and financial markets

The Coronavirus is spreading but could the cure be worse than the disease? We look at why we tend to overstate the risks of such events and examine the possible economic and financial market effects.

Which of the following would you choose, if forced: A) a 1-in-12,000 risk of losing $250 or B) a 1-in-50,000,000 risk of losing $850,000? Though the expected loss under B is smaller, I suspect you would choose A given the serious consequences of option B going wrong. Similar thinking explains why we worry about viruses such as Coronavirus but not simple flu, which in fact claims more lives (of which, more later).

As of the date of publication, there have been 24,554 reported cases of Novel Coronavirus (2019-nCov) and 492 reported deaths (World Health Organisation (WHO) data). Given that the first cases were reported by China to the WHO on 31 December 2019, the virus would appear to be spreading quickly.

Coronaviruses get their name from their crown like appearance under the microscope. They are not new, with the most recent common ancestor of all coronaviruses placed at around 8000 BC (10,000 years ago)[1]. Bats and birds are commonly the carriers but these viruses are now common among other species, including humans.

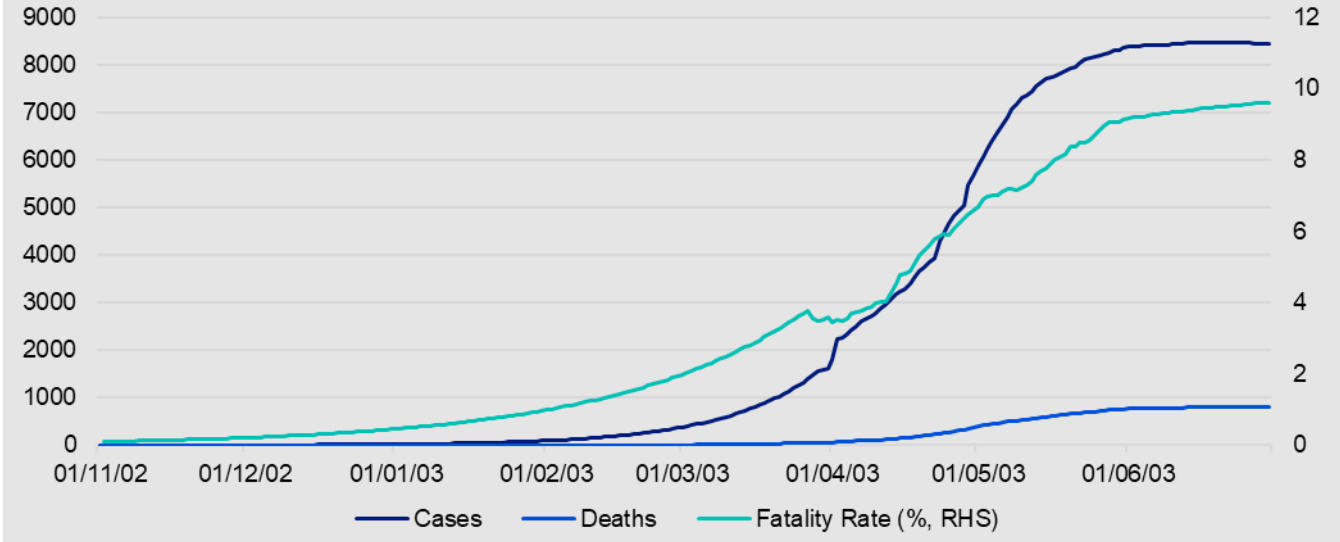
Coronaviruses typically cause mild respiratory infections in humans (they are thought to cause most common colds). Some rarer forms (SARS, MERS and Novel Coronavirus) can cause pneumonia and may be lethal. Human-to-human transmission is thought to be via respiratory droplets (coughing and sneezing). These viruses do not like heat but remain infectious until exposed to 56 degrees C for 90 minutes[2].

Figure 1 shows how the outbreak of SARS developed in 2002/03. The first known case was in China on 16 November 2002 but was not identified until much later. In fact, SARS was initially thought to be a problem in Hong Kong and Vietnam, though spreading (especially to Singapore, the US and Canada). However, when China released data to the WHO on 26 March 2003, it became apparent that China accounted for around 60% of global cases and deaths and was in fact the origin of the virus (see the footnote to **Figure 1**).

The number of SARS cases accelerated over time. As often happens with flu epidemics, the worst of the SARS outbreak occurred during the winter and early-spring period, with a flattening out of cases during Q2. It is commonly said that Novel Coronavirus has a lower fatality rate than SARS (around 2% versus nearly 10%). Strictly speaking this is true but note how the fatality rate of SARS increased over time (from around 3% in the early stages to 10%). The final number of SARS cases is reckoned to be 8096 with 744 deaths.

Though SARS spread to 29 countries, around 87% of the cases and deaths were in China and Hong Kong and only 11 countries recorded deaths (Canada stood out with 47 deaths and a fatality rate of 17%).

Figure 1 – SARS pandemic: cumulative number of reported probable cases and deaths



Notes: daily data from 1 November 2002 to 30 June 2003 (as reported at the time in the daily WHO "Cumulative number of reported Probable cases of SARS"). Fatality rate is the number of deaths divided by the number cases. Though the first cases were in China in November 2002, the WHO did not have any data from China until 26 March 2003, hence the discontinuity in the data. Prior to that data we have assumed a geometric progression in the number of cases up to that point. Missing data (weekends, say) is interpolated. Source: WHO and Invesco

Figure 2 shows that Novel Coronavirus has developed far more rapidly than SARS (in terms of cases), though the number of deaths remains lower (for now). This speed of transmission is one of the frightening aspects of this outbreak and has naturally led to concern being expressed in the media and by markets. Governments around the world are also taking preventative measures and China's economy is in a form of temporary lock-down.

However, it is interesting to ask why such outbreaks seem so frightening, especially when we compare the number of deaths in the last month (less than 500) to the 21,000 people that die in road accidents every month in China (112,000 globally) or the near 40,000 monthly global deaths from seasonal flu (assuming the deaths are spread evenly throughout the year).

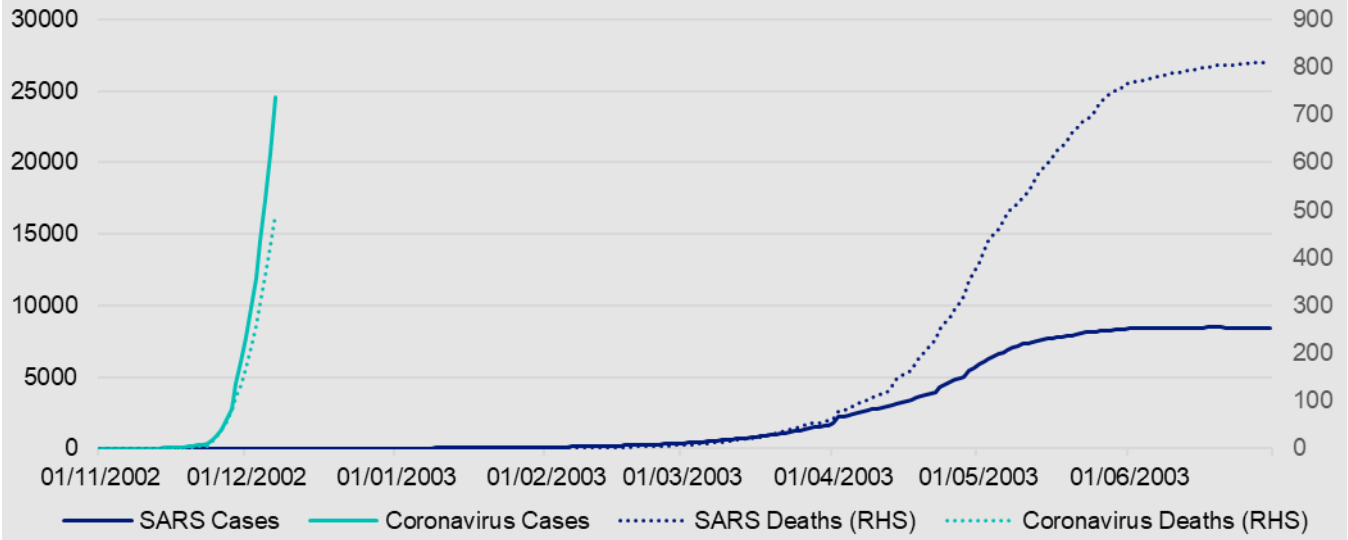
Seasonal flu is reckoned to impact 340m-1000m people per year (5-15% of the world's population), so there is a reasonable chance of contracting it. The number of deaths is reckoned to be 290k-650k per year. That is a lot of deaths but is less than 0.1% of the number of cases. So, the risk of contracting seasonal flu is high but the consequences are limited.

Based on the data available so far, we seem at very little risk of contracting the Novel Coronavirus (less than 0.01% if we assume the 25,000 cases so far is repeated every month throughout the year). Even with a fatality rate as high as SARS (10%), the probability of contracting and dying from this virus would be less than 0.001% (around 30,000 deaths in total). So, there is a small risk of catching this virus but the implications of doing so are quite serious.

Slovic et al[3] conducted experiments on the perception of risk. Though "experts" were found to have a decent grasp on the risk posed by various activities, substances and technologies, the same was not true for "lay-people". In particular, among "lay-people", groups of students and women (members of the League of Women Voters) rated nuclear power as the most risky ("risk of dying") out of 30 categories, whereas "experts" ranked it 20th (which is exactly where it was placed based on the researchers' assessment of the number of deaths in the US). On the other hand, "lay-people" ranked electric power (traditional power generation) as the 18th most risky, whereas "experts" ranked it 9th (it was 5th). By the way, the three most risky categories were smoking, alcoholic beverages and motor vehicles ("experts" correctly identified them but put motor vehicles first).

Furthermore, lay-people's perception of the high risk of nuclear power was not based upon their estimate of the number of deaths in an average year (their mean estimate was 20 versus the researchers' estimate of 100). Rather, it came from their belief about what would happen in a "disastrous" year. Based on the answers given, more than 40% of participants implicitly believed there would be more than 10,000 deaths in a disastrous nuclear year and more than 25% expected 100,000 or more fatalities (in other work, Slovic found respondents expected a serious nuclear accident to result in hundreds of thousands or even millions of deaths). Slovic compared this with the "worst-case" estimate of 3,300 prompt fatalities from the maximum credible nuclear accident, with the odds against such an accident being 3,000,000:1 (US Nuclear Regulatory Commission 1975).

Figure 2 – SARS and Novel Coronavirus outbreaks compared



Note: SARS data is daily from 1 November 2002 to 30 June 2003 (as reported at the time in the daily WHO "Cumulative number of reported Probable cases of SARS"). Though the first cases were in China in November 2002, the WHO did not have any data from China until 26 March 2003, hence the discontinuity in the data. Prior to that data we have assumed a geometric progression in the number of cases up to that point. Missing data (weekends, say) is interpolated. Novel Coronavirus data is daily from 31 December 2019 to 5 February 2020 with geometric interpolation of data until 21 January 2020. The Novel Coronavirus data is superimposed on the SARS data as though 31 December 2019 was 1 November 2002. Source: WHO and Invesco.

Slovic concluded that three factors form our perception of risk: dread, familiarity and the number of people exposed. This framework seems ideal for explaining the reaction to the Novel Coronavirus. As the name suggests it is new, hence the lack of familiarity (fear of the unknown). Second, the fact that it can be fatal instils dread. Finally, in theory we could all be exposed, which raises the potential number of deaths. The Spanish flu pandemic of 1918-20 is a great example of the latter point: it is thought that 500m contracted that strain of flu (one-third of the world's population) and that 50m-100m died (10%-20% of the number of cases and 3%-7% of the world's population).

Another element of unfamiliarity about the current outbreak is that it is occurring in China. Many in the West seem suspicious of anything Chinese. This became clear during the 2015 stock market sell-off in China, when a small devaluation of the currency sent global markets into a tail-spin. Given our lack of knowledge of such a vast country, we tend to make up what we don't know and assume the worst. The current reaction of other countries suggests that China is effectively being put into quarantine (though to be fair it has shut down much of its own economy).

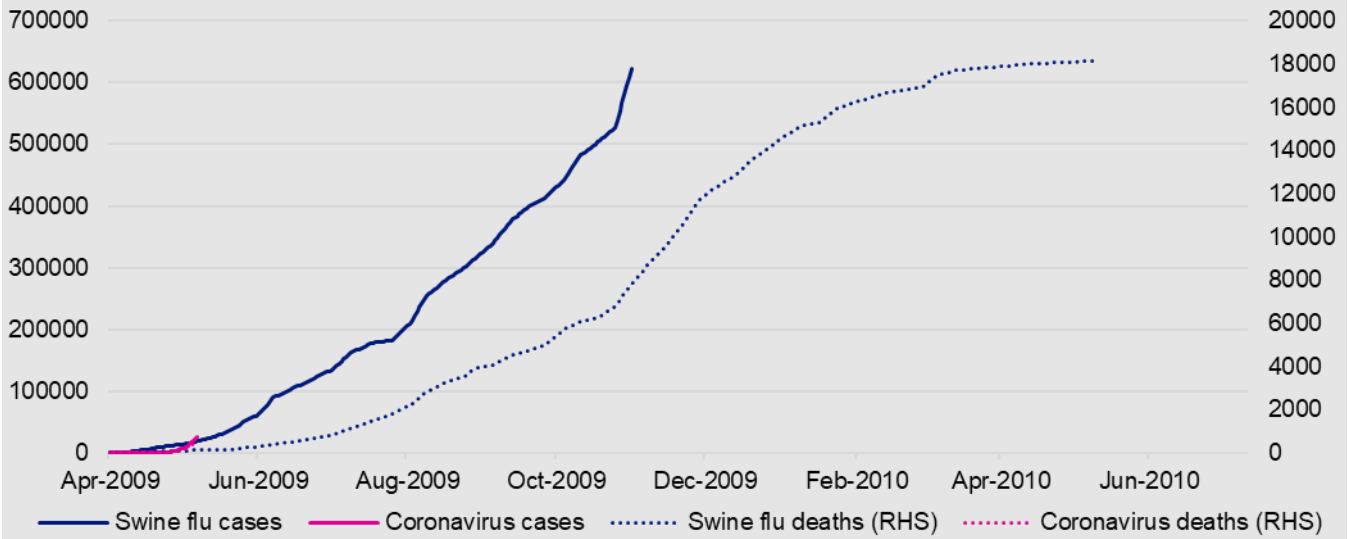
This attitude towards China is interesting when compared to what happened during the swine flu outbreak in 2009 (swine flu is the same A(H1N1) virus as Spanish flu). In the first month that swine flu data was reported, the US, Canada and Mexico accounted for 92% of all cases (the US alone accounted for 52%). By mid-2010 the worldwide death toll had risen to 18,449, with around 46% of them in the Americas (these were laboratory confirmed deaths but the US Center for Disease Control and Prevention puts the actual number of deaths at 151,700 to 575,500)[4].

Figure 3 suggests the path of the Novel Coronavirus is so far like the early stages of swine flu (though the number of deaths is higher). However, there was no suggestion of putting the US and its neighbours into quarantine in mid-2009. Is the dread and lack of familiarity with both the virus and China causing an overreaction on the part of non-Chinese governments? Perhaps in the modern world they cannot risk being seen to do nothing, especially when others are acting.

This, along with the self-imposed lock-down within China (perhaps due to mistakes made with SARS), risks making the cure worse than the disease, with unnecessary loss of income and welfare. According to the US National Academy of Medicine[5], the average direct global economic cost of infectious diseases is around US$60bn per year. However, using a more complete approach, Fan et al.[6] estimate the annual cost to be US$490bn, which is around 0.6% of global GDP. This cost is incurred every year, on average.

That average cost does not cover what happens during pandemics, when global costs are likely to be accentuated by the closure of travel and trading links. The World Bank estimated in 2014 that a pandemic on the scale of the 1918 Spanish flu would incur costs of around 5% of global GDP[7]. WHO data suggests the Ebola outbreak in Guinea, Liberia and Sierra Leone caused 28,616 cases (around 0.1% of the population) and 11,310 deaths (a fatality rate of 40%). The World Bank estimates those countries suffered a cumulative economic loss of at least 10% of GDP[8].

Figure 3 – Swine flu and Novel Coronavirus outbreaks compared



Note: Swine flu data is based on daily data from 27 April 2009 to 4 June 2010 (data on number of cases ended on 27 November 2009). Data was not always available daily: such gaps have been filled by simple interpolation. Novel Coronavirus data is daily from 31 December 2019 to 5 February 2020 with geometric interpolation of data until 21 January 2020. The Novel Coronavirus data is superimposed on the swine flu data as though 31 December 2019 was 27 April 2009. All data based on WHO situation reports. Source: WHO and Invesco.

The Spanish flu and Ebola examples are unlikely to provide good templates for the current outbreak in China (the fatality rate looks nowhere near as high as for Ebola and the way we deal with pandemics has evolved massively since 1918). At the same time, the economic damage caused to China could be greater than during the 2002/3 SARS outbreak. Though it is hard to know what might have happened otherwise, World Bank China GDP growth rates for 2001 (8.3%), 2002 (9.1%) and 2003 (10.1%) are not suggestive of a big issue. Also, to the extent that China is impacted, the knock-on effect on the rest of the world may now be greater as World Bank data suggests the Chinese economy in 2018 represented 15.8% (18.6% PPP basis) of global GDP versus 4.2% in 2002 (8.5%).

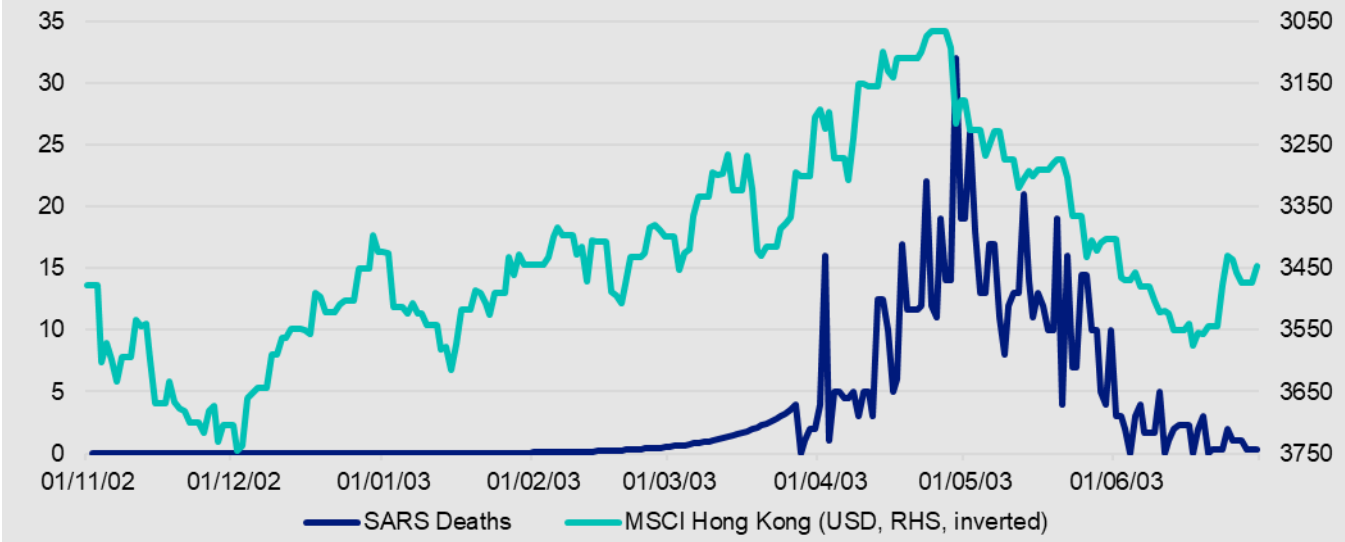
So, how bad could the economic effect be? Obviously, if the whole Chinese economy were shut down for a long period, the effect would be catastrophic at both the local and global level. Though we don't know how long this will last, there are some points of comfort: first, the lock-down started during the Chinese New Year period when the economy would have been largely closed for a week anyway; second, Hubei province (where most of the cases are occurring) accounted for only 4.4% of China's GDP in 2018 (according to China National Bureau of Statistics data); third, according to China's National Health Commission, 80% of deaths are in the over-60 age range and 75% had some underlying condition (which suggests much less risk for the general population); fourth, the China lock-down suggests radical action to stop the spread of the virus (as opposed to what happened in 2002/3) and, fifth, if the disruption is short, the loss of economic activity can be made up in subsequent periods.

So, hopefully, there will be a short, sharp downward shock to the Chinese economy during Q1, with recovery during Q2 and H2. We believe the best test of this hypothesis will be for how long daily cases and deaths continue to rise. **Figure 4** shows that SARS deaths progressed in an exponential fashion until peaking and then declined rapidly (the same applies to the number of cases). We would hope to see a peak soon but cases and deaths continue to accelerate for now. Also, in terms of putting matters into perspective, during the month that 400-500 people have died from Coronavirus, there are likely to have been 7,000-15,000 deaths in China from seasonal flu[9].

If the above is correct, we expect little noticeable effect on China's full year economic data and even less on global aggregates. If so, we believe financial markets will eventually be driven by other factors (global growth trends and politics in the US, for example).

However, we also believe the virus data will get worse before it gets better and would not be surprised to see further bouts of panic as cases and deaths accelerate and spread geographically. Normally, we would expect to see improvement as the weather improves during Q2 but the extreme measures taken by China could advance the peak in cases and deaths. **Figure 4** shows that SARS deaths peaked at the end of April 2003, which was when the Hong Kong stock market bottomed. It would be convenient if the two were linked but we are not sure: global markets were weak at that time for other reasons (the end of the dotcom bubble and the US invasion of Iraq) and no similar correlation with global markets is apparent during the swine flu outbreak (which was more centred on the US).

Figure 4 – SARS daily deaths and Hong Kong stocks



Note: daily data from 1 November 2002 to 30 June 2003 (as reported at the time in the daily WHO "Cumulative number of reported Probable cases of SARS"). "SARS Deaths" shows the number of deaths each day. Though the first cases were in China in November 2002, the WHO did not have any data from China until 26 March 2003, hence the discontinuity in the data. Prior to that data we have assumed a geometric progression in the number of cases up to that point. Missing data (weekends, say) is interpolated. Past performance is no guarantee of future results. Source: WHO, MSCI, Refinitiv Datastream and Invesco

We started the year believing that stock markets were stretched and in need of a consolidation phase. It strikes us that Coronavirus has given the pretext and we think it could yet push markets lower. However, and unless we are very much mistaken, we believe the economic impact of this virus will be short lived and barely noticeable by the end of the year. We therefore intend to use any future market weakness to add to our equity allocations (we are currently underweight equities – see our Model asset allocation in **Figure 8**). We would expect the biggest rebounds in the assets that have suffered the most over recent weeks, especially those in the emerging markets.

As said by a US president from a different era: the only thing to fear is fear itself.

Unless stated otherwise, all data as of 5 February 2020.

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Invesco

Figure 5 – Asset class total returns

Data as at 05/02/2020	Index	Current Level/RY	Total Return (USD, %) 1w	1m	QTD	YTD	12m	Total Return (Local Currency, %) 1w	1m	QTD	YTD	12m
Equities												
World	MSCI	573	1.1	1.3	1.6	1.6	18.6	1.2	1.8	2.3	2.3	19.4
Emerging Markets	MSCI	1089	-0.7	-3.0	-2.2	-2.2	6.7	-0.5	-2.2	-1.1	-1.1	8.8
US	MSCI	3183	1.9	3.4	3.6	3.6	24.4	1.9	3.4	3.6	3.6	24.4
Europe	MSCI	1779	0.9	-0.4	-0.2	-0.2	15.1	0.9	0.8	1.6	1.6	17.3
Europe ex-UK	MSCI	2143	1.3	0.4	0.7	0.7	17.6	1.3	1.7	2.5	2.5	20.6
UK	MSCI	1156	-0.3	-2.6	-2.9	-2.9	8.5	-0.2	-1.9	-0.9	-0.9	8.1
Japan	MSCI	3380	-0.4	-2.3	-1.7	-1.7	11.6	0.1	-0.7	-0.7	-0.7	11.5
Government Bonds												
World	BofA-ML	0.70	-0.4	-0.1	0.4	0.4	5.3	-0.3	0.9	1.4	1.4	6.3
Emerging Markets	JPM	5.22	0.2	-0.1	-0.3	-0.3	7.6	0.3	1.5	1.6	1.6	12.5
US (10y)	Datastream	1.65	-0.5	1.4	2.5	2.5	11.9	-0.5	1.4	2.5	2.5	11.9
Europe	Bofa-ML	0.18	-0.3	0.0	0.0	0.0	5.1	-0.3	1.5	2.0	2.0	9.0
Europe ex-UK (EMU, 10y)	Datastream	-0.37	0.0	-0.5	0.0	0.0	1.9	-0.1	1.0	2.0	2.0	5.7
UK (10y)	Datastream	0.60	-0.8	0.7	0.2	0.2	7.4	-0.7	1.4	2.2	2.2	7.0
Japan (10y)	Datastream	-0.04	-0.5	-1.3	-0.7	-0.7	0.7	0.0	0.2	0.2	0.2	0.6
IG Corporate Bonds												
Global	BofA-ML	2.15	-0.3	0.4	0.9	0.9	10.1	-0.3	0.9	1.6	1.6	11.2
US	BofA-ML	2.76	-0.4	1.1	1.8	1.8	13.8	-0.4	1.1	1.8	1.8	13.8
Europe	BofA-ML	0.49	0.1	-0.9	-1.1	-1.1	2.1	0.0	0.6	0.9	0.9	5.9
UK	BofA-ML	1.98	-0.7	0.9	0.4	0.4	11.7	-0.6	1.5	2.5	2.5	11.3
Japan	BofA-ML	0.38	-0.5	-1.4	-0.8	-0.8	1.0	0.0	0.2	0.2	0.2	0.9
HY Corporate Bonds												
Global	BofA-ML	5.60	0.2	0.3	0.4	0.4	9.2	0.2	0.6	0.8	0.8	9.9
US	BofA-ML	6.04	0.3	0.3	0.5	0.5	9.2	0.3	0.3	0.5	0.5	9.2
Europe	BofA-ML	3.19	0.3	-1.0	-1.4	-1.4	5.3	0.2	0.4	0.6	0.6	9.2
Cash (Overnight LIBOR)												
US		1.57	0.0	0.1	0.2	0.2	2.1	0.0	0.1	0.2	0.2	2.1
Euro Area		-0.57	-0.1	-1.5	-2.0	-2.0	-4.1	0.0	0.0	-0.1	-0.1	-0.5
UK		0.68	-0.1	-0.6	-1.9	-1.9	1.1	0.0	0.1	0.1	0.1	0.7
Japan		-0.08	-0.7	-1.6	-1.1	-1.1	0.0	0.0	0.0	0.0	0.0	-0.1
Real Estate (REITs)												
Global	FTSE	2040	-0.1	0.5	0.4	0.4	11.7	-0.5	1.6	2.0	2.0	15.4
Emerging Markets	FTSE	2276	-0.2	-9.0	-8.2	-8.2	6.3	-0.6	-8.0	-6.6	-6.6	9.9
US	FTSE	3310	0.0	3.0	2.4	2.4	13.3	0.0	3.0	2.4	2.4	13.3
Europe ex-UK	FTSE	3879	0.6	1.3	2.1	2.1	15.7	0.3	2.4	3.9	3.9	19.6
UK	FTSE	1533	-0.5	-2.5	-3.9	-3.9	18.3	-0.6	-2.1	-2.2	-2.2	17.6
Japan	FTSE	3099	0.2	2.6	3.2	3.2	18.6	0.4	3.9	3.9	3.9	18.0
Commodities												
All	GSCI	2297	-3.1	-12.8	-11.4	-11.4	-4.9	-	-	-	-	-
Energy	GSCI	418	-4.7	-18.5	-16.0	-16.0	-4.7	-	-	-	-	-
Industrial Metals	GSCI	1144	0.4	-6.0	-6.1	-6.1	-9.4	-	-	-	-	-
Precious Metals	GSCI	1824	-0.7	0.1	2.0	2.0	16.9	-	-	-	-	-
Agricultural Goods	GSCI	340	-0.7	-1.3	-2.2	-2.2	-5.5	-	-	-	-	-
Currencies (vs USD)*												
EUR		1.10	-0.1	-1.4	-1.9	-1.9	-3.6	-	-	-	-	-
JPY		109.82	-0.7	-1.6	-1.1	-1.1	0.1	-	-	-	-	-
GBP		1.30	-0.2	-0.7	-2.0	-2.0	0.3	-	-	-	-	-
CHF		1.03	0.0	-0.1	-0.6	-0.6	2.7	-	-	-	-	-
CNY		6.97	-0.5	-0.1	-0.2	-0.2	-3.3	-	-	-	-	-

Notes: *The currency section is organised so that in all cases the numbers show the movement in the mentioned currency versus USD (+ve indicates appreciation, -ve indicates depreciation). Past performance is no guarantee of future results. Please see appendix for definitions, methodology and disclaimers.
Source: Refinitiv Datastream and Invesco

Figure 6 – World equity sector total returns relative to market (%)

Data as at 05/02/2020	Global				
	1w	1m	QTD	YTD	12m
Energy	**-0.9**	**-7.1**	**-6.3**	**-6.3**	**-14.8**
Basic Materials	**0.0**	**-2.9**	**-3.8**	**-3.8**	**-9.4**
Basic Resources	-0.2	-3.7	-4.1	-4.1	-10.0
Chemicals	0.2	-1.8	-3.4	-3.4	-9.0
Industrials	**-0.3**	**0.0**	**0.3**	**0.3**	**-0.1**
Construction & Materials	-0.3	-0.6	-0.8	-0.8	-0.6
Industrial Goods & Services	-0.3	0.1	0.5	0.5	0.0
Consumer Discretionary	**0.6**	**-0.9**	**-0.8**	**-0.8**	**-1.6**
Automobiles & Parts	-1.0	-3.4	-3.7	-3.7	-10.4
Media	0.8	-2.0	-2.0	-2.0	2.2
Retailers	2.6	1.9	2.1	2.1	1.4
Travel & Leisure	-0.1	-3.6	-3.4	-3.4	-4.8
Consumer Products & Services	-0.6	-0.7	-0.5	-0.5	0.4
Consumer Staples	**-0.1**	**0.0**	**-0.3**	**-0.3**	**-2.1**
Food, Beverage & Tobacco	-0.4	-0.4	-0.5	-0.5	-1.1
Personal Care, Drug & Grocery Stores	0.3	0.8	0.0	0.0	-0.3
Healthcare	**0.6**	**2.1**	**1.4**	**1.4**	**2.7**
Financials	**0.3**	**-1.5**	**-1.7**	**-1.7**	**-3.0**
Banks	0.0	-3.5	-3.9	-3.9	-8.5
Financial Services	0.7	1.4	1.2	1.2	6.2
Insurance	0.5	-0.4	-0.4	-0.4	-1.1
Real Estate	**-0.7**	**-0.6**	**-0.9**	**-0.9**	**-1.3**
Technology	**-0.1**	**3.8**	**4.6**	**4.6**	**16.6**
Telecommunications	**-0.1**	**-0.3**	**-0.5**	**-0.5**	**-4.2**
Utilities	**-1.0**	**3.8**	**3.1**	**3.1**	**2.0**

Notes: Returns shown are for Datastream sector indices versus the total market index. Past performance is no guarantee of future results.
Source: Refinitiv Datastream and Invesco

Figure 7a – US factor index total returns (%)

Data as at 05/02/2020	Absolute					Relative to Market				
	1w	1m	QTD	YTD	12m	1w	1m	QTD	YTD	12m
Growth	2.5	3.1	2.8	2.8	25.4	0.6	-0.1	-0.5	-0.5	0.9
Low volatility	1.9	4.9	4.5	4.5	22.6	0.0	1.7	1.1	1.1	-1.3
Price momentum	0.9	3.0	3.4	3.4	18.0	-1.0	-0.2	0.1	0.1	-5.0
Quality	2.1	-0.2	-0.3	-0.3	13.4	0.2	-3.3	-3.5	-3.5	-8.7
Size	2.8	1.0	-0.1	-0.1	8.7	0.9	-2.1	-3.3	-3.3	-12.5
Value	3.0	-0.8	-1.7	-1.7	11.6	1.1	-3.9	-4.9	-4.9	-10.2
Market	1.9	3.2	3.3	3.3	24.2					
Market - Equal-Weighted	1.8	2.0	1.7	1.7	18.2					

Notes: All indices are subsets of the S&P 500 index, they are rebalanced monthly, use data in US dollars and are equal-weighted. Growth includes stocks in the top third based on both their 5-year sales per share trend and their internal growth rate (the product of the 5-year average return on equity and the retention ratio); Low volatility includes stocks in the bottom quintile based on the standard deviation of their daily returns in the previous three months; Price momentum includes stocks in the top quintile based on their performance in the previous 12 months; Quality includes stocks in the top third based on both their return on invested capital and their EBIT to EV ratio (earnings before interest and taxes to enterprise value); Size includes stocks in the bottom quintile based on their market value in US dollars. Value includes stocks in the bottom quintile based on their price to book value ratios. The market represents the S&P 500 index. Past performance is no guarantee of future results.
Source: Refinitiv Datastream and Invesco

Figure 7b – European factor index total returns relative to market (%)

Data as at 05/02/2020	Absolute					Relative to Market				
	1w	1m	QTD	YTD	12m	1w	1m	QTD	YTD	12m
Growth	1.0	3.1	3.4	3.4	27.1	0.0	1.8	1.4	1.4	5.7
Low volatility	0.7	2.9	3.6	3.6	22.6	-0.3	1.5	1.6	1.6	2.0
Price momentum	1.3	3.9	4.4	4.4	24.0	0.3	2.6	2.4	2.4	3.1
Quality	1.1	1.0	0.8	0.8	21.9	0.1	-0.3	-1.1	-1.1	1.4
Size	0.6	-0.9	-0.6	-0.6	26.0	-0.4	-2.2	-2.5	-2.5	4.8
Value	0.1	-3.5	-3.0	-3.0	9.4	-0.9	-4.8	-4.9	-4.9	-9.0
Market	1.0	1.3	1.9	1.9	20.2					
Market - Equal-Weighted	1.0	1.1	1.5	1.5	19.4					

Notes: All indices are subsets of the STOXX 600 index, they are rebalanced monthly, use data in euros and are equal-weighted. Growth includes stocks in the top third based on both their 5-year sales per share trend and their internal growth rate (the product of the 5-year average return on equity and the retention ratio); Low volatility includes stocks in the bottom quintile based on the standard deviation of their daily returns in the previous three months; Price momentum includes stocks in the top quintile based on their performance in the previous 12 months; Quality includes stocks in the top third based on both their return on invested capital and their EBIT to EV ratio (earnings before interest and taxes to enterprise value); Size includes stocks in the bottom quintile based on their market value in euros; Value includes stocks in the bottom quintile based on their price to book value ratios. The market represents the STOXX 600 index. Past performance is no guarantee of future results.
Source: Refinitiv Datastream and Invesco

Figure 8 – Model asset allocation

	Neutral	Policy Range		Allocation	Position vs Neutral	Hedged	Currency
Cash	**5%**	**0-10%**		**5%**			
Cash	2.5%			5%			
Gold	2.5%			0%			
Bonds	**45%**	**10-80%**	↑	47%			
Government	30%	10-50%	↑	17%			
US	10%		↑	7%			
Europe ex-UK (Eurozone)	8%			0%			
UK	2%		↓	2%			
Japan	8%			4%			
Emerging Markets	2%			4%			
Corporate IG	10%	0-20%	↑	20%			
US Dollar	5%			10%			
Euro	3%		↑	6%			
Sterling	1%			2%			
Japanese Yen	1%			2%			
Corporate HY	5%	0-10%	↑	10%			
US Dollar	4%			8%			
Euro	1%		↑	2%			
Equities	**45%**	**20-70%**	↓	40%			
US	25%			12%			
Europe ex-UK	7%		↓	8%			
UK	4%		↓	4%			
Japan	4%			8%			
Emerging Markets	5%			8%			
Real Estate	**3%**	**0-6%**		6%			
US	1%			0%			
Europe ex-UK	1%			2%			
UK	0.5%		↓	0%			
Japan	0.5%		↑	2%			
Emerging Markets	0%			2%			
Commodities	**2%**	**0-4%**	↑	2%			
Energy	1%		↑	1%			
Industrial Metals	0.3%		↑	1%			
Precious Metals	0.3%			0%			
Agriculture	0.3%			0%			
Total	**100%**			**100%**			
Currency Exposure (including effect of hedging)							
USD	49%		↑	41%			
EUR	21%		↑	19%			
GBP	8%		↓	8%			
JPY	14%			17%			
EM	7%			15%			
Total	**100%**			**100%**			

Notes: This is a theoretical portfolio and is for illustrative purposes only. See the latest The Big Picture document for more details. It does not represent an actual portfolio and is not a recommendation of any investment or trading strategy. Arrows indicate the direction of the most recent changes.
Source: Invesco

Figure 9 – Model allocations for Global sectors

	Neutral	Invesco
Energy	**5.7%**	**Neutral**
Basic Materials	**4.3%**	**Overweight**
Basic Resources	2.3%	Overweight
Chemicals	2.0%	Neutral
Industrials	**13.0%**	**Underweight**
Construction & Materials	1.6%	Neutral
Industrial Goods & Services	11.4%	Underweight
Consumer Discretionary	**13.8%**	**Neutral**
Automobiles & Parts	2.1%	Neutral
Media	1.3%	Overweight
Retailers	4.3%	Underweight
Travel & Leisure	2.3%	Overweight
Consumer Products & Services	3.7%	Neutral
Consumer Staples	**7.4%**	**Overweight**
Food, Beverage & Tobacco	4.8%	Overweight
Personal Care, Drug & Grocery Stores	2.5%	Overweight
Healthcare	**9.8%**	**Overweight**
Financials	**17.6%**	**Underweight**
Banks	8.6%	Neutral
Financial Services	4.8%	Underweight
Insurance	4.2%	Underweight
Real Estate	**4.3%**	**Overweight**
Technology	**15.6%**	**Underweight**
Telecommunications	**4.8%**	**Underweight**
Utilities	**3.8%**	**Underweight**

Notes: These are theoretical allocations which are for illustrative purposes only. They do not represent an actual portfolio and are not a recommendation of any investment or trading strategy. See the latest Strategic Sector Selector for more details.
Source: Refinitiv Datastream and Invesco

Appendix

Definitions of data and benchmarks for Figure 5

Sources: we source data from Datastream unless otherwise indicated.

Cash: returns are based on a proprietary index calculated using the Intercontinental Exchange Benchmark Administration overnight LIBOR (London Interbank Offer Rate). The global rate is the average of the euro, British pound, US dollar and Japanese yen rates. The series started on 1st January 2001 with a value of 100.

Gold: London bullion market spot price in USD/troy ounce.

Government bonds: Current levels, yields and total returns use Datastream benchmark 10-year yields for the US, Eurozone, Japan and the UK, and the Bank of America Merrill Lynch government bond total return index for the World and Europe. The emerging markets yields and returns are based on the JP Morgan emerging markets global composite government bond index.

Corporate investment grade (IG) bonds: Bank of America Merrill Lynch investment grade corporate bond total return indices.

Corporate high yield (HY) bonds: Bank of America Merrill Lynch high yield total return indices

Equities: We use MSCI benchmark gross total return indices for all regions.

Commodities: Goldman Sachs Commodity total return indices

Real estate: FTSE EPRA/NAREIT total return indices

Currencies: Global Trade Information Services spot rates

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